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## PATENT ABSTRACTS OF JAPAN

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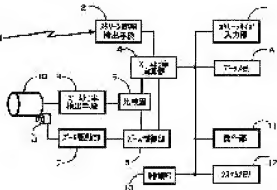
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## (54) PROJECTOR CAPABLE OF EASILY ADJUSTING PICTURE SIZE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a projector constituted so that the display picture size of the projector installed at an optional distance from a screen can be easily set just by selecting the menu of the display picture.

SOLUTION: A projection screen size is inputted in a screen size input part 1. A screen distance detection means 2 detects a distance from the projector to the screen. A zoom ratio computing element 4 computes the zoom ratio of a zoom lens based on the distance to the screen which is stored in a data memory 2 and the screen size. A zoom driving motor 8, a zoom control part 6 and a zoom driving part 7 drive the zoom lens. A zoom ratio detection means 9 detects the mechanical zoom ratio of the zoom lens. A comparator 5 compares the zoom ratio detected by the means 9 with the zoom ratio computed and outputted by the computing element 4 and



computes and outputs a difference between them.

**CLAIMS**

[Claim(s)]

[Claim 1] Condense an outputted ray from a light source by an optical system, and light modulation is carried out by LCD (liquid crystal display element) etc. which have a light shutter changed and driven with an input picture signal, In a projector which carries out an expansion output by a zoom lens system for projection, and carries out the display output of the projection image on a screen, A screen size input part which inputs projection screen size, and said projector and a screen distance detecting means which detects distance to said screen, Said inputted screen size and data memory which stores temporarily said detected distance to a screen, A rate computing unit of a zoom ratio which calculates a rate of a zoom ratio of said zoom lens from distance and screen size to said screen memorized by said data memory, A motor for zooming drives which drives a zoom lens, and a zoom control part which controls said motor for zooming drives to become the zoom ratio which carried out the operation output with said rate computing unit of a zoom ratio, A zooming drive part which drives said motor for zooming drives with said zoom control part output, and a rate detection means of a zoom ratio to detect a rate of a mechanical zoom ratio of a zoom lens, Compare a rate of a zoom ratio in which a rate of a zoom ratio detected by said rate detection means of a zoom ratio and said rate computing unit of a zoom ratio carried out the operation output, and the difference is constituted from a comparator which carries out an operation output, When screen size of hope is inputted from said screen size input part, said rate computing unit of a zoom ratio, A simple screen size adjustment projector which carries out the operation output of the rate of a zoom ratio of said zoom lens in distance to said screen which said screen distance detecting means detected, and is characterized by controlling a rate of a zoom ratio of said zoom lens with this rate operation output of a zoom ratio.

[Claim 2] An operation input section installed in said projector body part in said screen size input part, A selection menu memory which has memorized selection menu data of screen size of said projector, The simple screen size adjustment projector according to claim 1 constituting from a display control part which generates a status signal which displays said selection menu on a display screen of this projector, and carrying out the selection input of the display screen size of said projector to wish on a projector display screen.

[Claim 3] A remote control input part which inputs a remote control signal according said screen size input part to infrared rays or a feeble radio wave means from a remote control input part of the device exterior, A selection menu memory which has memorized selection menu data of screen size of said projector, The simple screen size adjustment projector according to claim 1 constituting from a display control part which generates a status signal which displays said selection menu on a display screen of this projector, and carrying out the selection input of the display screen size of said projector to wish on a projector display screen.

[Claim 4] The simple screen size adjustment projector according to claim 1 making said screen distance detecting means into an input means by manual operation from a final controlling element allocated by said projector body part or remote control.

[Claim 5] A focal position transducer which detects a mechanical focus adjustment position of said zoom lens for said screen distance detecting means, A screen position calculation machine which carries out an operation output constitutes distance to a screen from said detected focal adjustment position, The simple screen size adjustment projector according to claim 1 carrying out the operation output of the

distance to a screen for said screen distance from a mechanical focus adjustment position of said zoom lens.

[Claim 6]The simple screen size adjustment projector according to claim 5 using said focal position transducer as a rotation sensor which detects an angle of rotation of a focus adjustment driving shaft.

[Claim 7]The simple screen size adjustment projector according to claim 5 using said focal position transducer as a straight-line sensor which detects the amount of sliding of a rectilinear direction of a focus adjustment driving shaft.

[Claim 8]A timing pulse generating part which generates a periodic timing pulse for said screen distance detecting means, A modulation part which modulates ultrasonic carrier waves by said timing pulse, and an ultrasonic output element which turns said ultrasonic modulation signal to said screen, and carries out an ultrasonic output, An actuator which drives said ultrasonic output element by said ultrasonic carrier waves, and ultrasonic wave receiving elements, such as a microphone which receive a reflected sound from said screen and is changed into an input signal, A wave detector which carries out linear detection of said input signal, and restores to a receiving timing pulse, The simple screen size adjustment projector according to claim 1 constituting from a time lag computing unit which carries out the operation output of the time lag with a receiving timing pulse which carried out received detection with said timing pulse, and a distance computing unit which carries out the operation output of the distance to a screen from said time lag operation output.

[Claim 9]The simple screen size adjustment projector according to claim 8 adding an ultrasonic translator which changes to a reflected sound from said screen, changes said ultrasonic output sound into an input signal, amplifies this input signal, and is again resent as an ultrasonic sound from an ultrasonic output element.

[Claim 10]The simple screen size adjustment projector according to claim 8 making said ultrasonic output element into ultrasonic wave speakers.

[Claim 11]The simple screen size adjustment projector according to claim 8 considering it as a ceramic electrostriction element which will cause attenuation-of-ultrasonic-wave vibration if an electrical signal is given for said ultrasonic output element.

[Claim 12]The simple screen size adjustment projector according to claim 1 constituting from a polar switcher which changes the polarity of service voltage to a DC motor which drives said rate of a zoom ratio for said zoom control part, and a controller controlled by said comparator output signal.

[Claim 13]A polar switcher which changes the polarity of service voltage to a stepping motor which drives said rate of a zoom ratio for said zoom control part, With a drive pulse table which has memorized relation between said rate operation output of a zoom ratio, and the number of steps of said stepping motor, and said rate operation output of a zoom ratio. The simple screen size adjustment projector according to claim 1 constituting from a driving pulse generator which reads the required number of drive pulses and generates a drive pulse from said drive pulse table.

[Claim 14]The simple screen size adjustment projector according to claim 1 using said rate detection means of a zoom ratio as a rotation sensor which detects an angle of rotation of a driving shaft for the rate adjustment of a zoom ratio.

[Claim 15]The simple screen size adjustment projector according to claim 1 using said rate detection means of a zoom ratio as a straight-line sensor which detects the amount of straight-line sliding of a driving shaft for the rate adjustment of a zoom ratio.

[Translation done.]

**DETAILED DESCRIPTION**

[Detailed Description of the Invention]

[0001]

[Field of the Invention]It is involved in the screen size setting-up method on a simple screen at the time of installing the projector using a zoom lens arbitrarily.

[0002]

[Description of the Prior Art]Condense the outputted ray from a light source by an optical system, and light modulation is carried out by LCD (liquid crystal display element) etc. which have a light shutter changed and driven with an input picture signal, The move installation type projector which carries out an expansion output by the zoom lens system for projection, and carries out the display output of the projection image on a screen becomes various [ the place installed ], and the user of this projector crosses it to many and unspecified persons. There is a usage pattern that the distance and screen size to the screen installed change each time, and a display screen is not specific and the case of Shirakabe, a white sheet, etc. also has it. A user turns this projector to a screen each time, and adjusts an optic axis, a focus, screen size, a luminosity, etc. There is no target for a screen to serve as a rule of thumb of screen size in the case of Shirakabe, a white sheet or a giant screen, etc., and pains is taken over setting out.

[0003]

[Problem(s) to be Solved by the Invention]This invention aims at offer of the projector which can set up the display screen size of pro JIEKU installed in arbitrary distance simple only by selecting the menu of a display screen from a screen in view of the above problem.

[0004]

[Means for Solving the Problem]In a projector which condenses an outputted ray from a light source by an optical system, and light modulation is carried out by LCD etc. which have a light shutter changed and driven with an input picture signal, carries out an expansion output by a zoom lens system for projection, and carries out the display output of the projection image on a screen, A screen size input part which inputs projection screen size, and a projector and a means to detect distance to a screen, Inputted screen size and data memory which stores distance to a detected screen temporarily, A rate computing unit of a zoom ratio which calculates a rate of a zoom ratio of a zoom lens from distance and screen size to a screen memorized by data memory, A zooming drive motor which drives a zoom lens, and a zoom control part which controls a zooming drive motor so that a rate computing unit of a zoom ratio serves as a zoom ratio which carried out the operation output, With a zoom control part output, said zooming drive part which carries out a zooming drive motor drive, A rate of a zoom ratio detected by rate detection means of a zoom ratio to detect a rate of a mechanical zoom ratio of a zoom lens, and a rate detection means of a zoom ratio, and a rate computing unit of a zoom ratio compare a rate of a zoom ratio which carried out the operation output, and constitute the difference from a comparator which carries out an operation output.

[0005]An operation input section installed in a projector body part in a screen size input part, A selection menu memory which has memorized selection menu data of screen size of this projector, It constitutes from a display control part which generates a status signal which displays a selection menu on a display screen of a projector, Or a remote control input part which inputs a remote control signal by infrared rays or a feeble radio wave means from a remote control input part of the device exterior, It constitutes from a selection menu memory which has memorized selection menu data of screen size of a

projector, and a display control part which generates a status signal which displays a selection menu on a display screen of this projector.

[0006]a screen distance detecting means being made into an input means by manual operation, or from a final controlling element allocated by a projector body part or remote control, It constitutes from a focal position transducer which detects a mechanical focus adjustment position of a zoom lens, and a screen position calculation machine which carries out the operation output of the distance to a screen from a detected focal adjustment position.

[0007]It is considered as a rotation sensor which detects an angle of rotation of a focus adjustment driving shaft for a focal position transducer, or a straight-line sensor which detects the amount of sliding of a rectilinear direction of a focus adjustment driving shaft.

[0008]Or a timing pulse generating part which generates a periodic timing pulse for a screen distance detecting means, A modulation part which modulates ultrasonic carrier waves by a timing pulse, and an ultrasonic output element which turns an ultrasonic modulation signal to said screen, and carries out an ultrasonic output, An actuator which drives an ultrasonic output element by ultrasonic carrier waves, and ultrasonic wave receiving elements, such as a microphone which receive a reflected sound from a screen and is changed into an input signal, Linear detection of the input signal is carried out, and a wave detector which restores to a receiving timing pulse, a time lag computing unit which carries out the operation output of the time lag with a receiving timing pulse which carried out received detection with a timing pulse, and a distance computing unit which carries out the operation output of the distance to a screen from this time lag operation output constitute. It changes to a reflected sound from a screen, an ultrasonic output sound is changed into an input signal, and a translator which amplifies this input signal and is again resent as an ultrasonic sound from an ultrasonic output element is added.

[0009]If ultrasonic wave speakers or an electrical signal is given for an ultrasonic output element, it will be considered as a ceramic electrostriction element which causes attenuation-of-ultrasonic-wave vibration.

[0010]it being with a polar switcher which changes the polarity of service voltage to a DC motor which drives a rate of a zoom ratio for a zoom control part, and a controller controlled by a comparator output signal, or, A polar switcher which changes the polarity of service voltage to a stepping motor which drives a rate of a zoom ratio, It constitutes from a drive pulse table which has memorized relation between a rate operation output of a zoom ratio, and the number of steps of a stepping motor, and a driving pulse generator which generates the number of drive pulses more nearly required than a drive pulse table with the rate operation output of a zoom ratio.

[0011]It is considered as a rotation sensor which detects an angle of rotation of a driving shaft for the rate adjustment of a zoom ratio for a rate detection means of a zoom ratio, or a straight-line sensor which detects the amount of straight-line sliding of a driving shaft for the rate adjustment of a zoom ratio.

[0012]

[Embodiment of the Invention]The important section block diagram of one example of the projector according [ [drawing 1](#) ] to this invention, the detailed block diagram of the screen size input part according [ [drawing 2](#) ] to this invention, The block diagram of the example of the screen distance detecting means according [ [drawing 3](#) ] to this invention, the block diagram of the example of the zoom control part according [ [drawing 4](#) ] to this invention, and [drawing 5](#) are the examples of a menu screen by this invention. A user performs adjustment, focus adjustment, etc. of an optic axis using the final controlling element 11, looking at the menu screen shown in [drawing 5](#) first, after installation of a

projector finishes. Adjustment of screen display size carries out the selection input of the size of hope out of a menu screen (drawing 5) using the screen size input part 1. The screen size data by which the selection input was carried out is stored temporarily at the data memory 3. On the other hand, the detect output of the distance to a screen is carried out by the screen distance detecting means 2 as distance data, and it is stored temporarily at the data memory 3. The rate computing unit 4 of a zoom ratio carries out the operation output of the rate of a zoom ratio of the zoom lens used as predetermined screen size with both data. Based on the rate data of a zoom ratio by which the operation output was carried out, the zoom control part 6 generates the control signal which controls the motor 8 which drives the rate mechanism of a zoom ratio of the zoom lens 10, and inputs it into the zooming drive part 7. A rate detection means 9 of a zoom ratio to detect a ratio mechanically and indirectly is attached to the zoom lens 10, and the comparison operation of the rate data of a zoom ratio from this rate detection means 9 of a zoom ratio is carried out to the rate data of a zoom ratio from the rate computing unit 4 of a zoom ratio by the comparator 5. This comparison-operation result is fed back to the zoom control 6, and zoom control voltage is outputted until that difference turns to 0. 12 is a system memory, the sequence program of this device of operation is memorized, and the control section 13 controls the whole device along with this sequence program of operation.

[0013]In drawing 2, a screen size setting input reads the selection screen data of screen size as shows drawing 5 an example from the selection menu memory 1b which has memorized this data, and the display control part 1c generates it. (b) It sets and the selection input of the screen size is carried out by icon operation from the operation input section 1a attached to the main part. (\*\*) Set and the remote control input part 1d carries out the received input of the control input signal by infrared rays or a feeble radio wave means from a remote control unit, etc.

[0014]Drawing 3 shows the various methods of the screen distance detecting means. (b) Compute the distance to a screen from the focal adjustment position of an optical mechanism system paying attention to the focus adjustment mechanism of a zoom lens. As for focus adjustment, drive controlling of the drive motor 15 for focus adjustments is carried out by the focal actuator 14. The driving shaft of this motor 15 is slowed down by a gear etc., and rotates or drives [ straight-line sliding ] the focus adjustment mechanism of a zoom lens. The focusing position (distance and correlation to a screen) of this lens is proportional to angle of rotation or the amount of straight-line sliding of said rotation. The detect output of this focusing position is carried out as focal position data by the focal position transducer 2a. As for the focal position transducer 2a, according to a focus adjustment mechanism, a rotation sensor method or a straight-line sensor method is adopted. Screen position calculation machine 2b carries out the operation output of the screen position data based on the correlation function of focal position data peculiar to this zoom lens focus adjustment mechanism, and the distance to a screen.

[0015](\*\*) Carry out the automatic meter reading of the distance of screen S \*\* in simple using an ultrasonic wave. The timing pulse generating part 21 generates the pulse signal of 10msec width a 100msec cycle. The modulation part 22 modulates the 40-kHz subcarrier from the ultrasonic wave oscillator which is not illustrated with this pulse signal, and carries out an abnormal-conditions output at the actuator 23. The actuator 23 drives the ultrasonic output elements 24, such as ultrasonic wave speakers or electrostriction ceramics, and discharges an ultrasonic signal towards the screen S. The conversion output of the reflected sound from the screen S is carried out to an input signal by ultrasonic wave receiving elements, such as an ultrasonic microphone. After an input signal is amplified with the



amplifier 26, linear detection of it is carried out with the wave detector 27, and it generates a receiving timing pulse. The time lag computing unit 28 carries out the operation output of the time difference data of this receiving timing pulse and the timing pulse from the timing pulse generating part 21. The distance computing unit 29 carries out the operation output of the distance to a screen by one half of the values of said time difference data, and a product with the 340 m/sec sonic abbreviation for standard space. In (\*\*), in preparation for the case where reflection by a screen is insufficient, the having-function of ultrasonic reception and retransmission of message ultrasonic wave translator 30 was installed near the screen temporarily, and the role of the light reflector of an ultrasonic wave was given.

[0016] In drawing 4, (b) shows the composition of the zoom control part at the time of using a common DC motor for the rate adjustment drive motor 8 of a zoom ratio. The rate operation output of a zoom ratio from the rate computing unit 4 of a zoom ratio is inputted into the controller 62. DC power supply are connected to the controller 62, and the output voltage is controlled by said operation output. On the other hand, the polar switcher 62 performs the polarity of the output voltage to the zooming drive part 7, and ON/OFF control with the comparing output data from the comparator 5. The polarity which the polarity to which the rate operation output of a zoom ratio makes this motor a normal rotation direction in being large compared with the rate detect output of a zoom ratio makes a reverse rotation direction in being conversely small is chosen, and further, this control will be made into an open condition, if that difference becomes zero.

[0017] (\*\*) The composition of the zoom control part at the time of using the stepping motor which carries out definite angle rotation for every pulse input is shown in the rate adjustment drive motor 8 of a zoom ratio. With the rate operation output of a zoom ratio from the rate computing unit 4 of a zoom ratio, from the drive pulse table which has memorized the relation between the rate of a zoom ratio, and the number of drive pulses, the driving pulse generator 63 reads an applicable pulse number, and outputs a drive pulse. On the other hand, the polar switcher 62 performs the polarity of the output voltage to the zooming drive part 7, and ON/OFF control with the comparing output data from the comparator 5. The polarity which the polarity to which the rate operation output of a zoom ratio makes this motor a normal rotation direction in being large compared with the rate detect output of a zoom ratio makes a reverse rotation direction in being conversely small is chosen, and further, this control will be made into an open condition, if that difference becomes zero.

[0018]

[Effect of the Invention] This invention is carried out with a gestalt which was explained above, and does so the effect described below. By having constituted from a screen size input part, data memory, the rate computing unit of a zoom ratio, a zooming drive motor, the zoom control part, a zooming drive part, a rate detection means of a zoom ratio, and a comparator, When the screen size of hope is inputted from a screen size input part, the rate computing unit of a zoom ratio, The operation output of the rate of a zoom ratio of a zoom lens was able to be carried out in the distance to the screen which the screen distance detecting means detected, and the rate of a zoom ratio of the zoom lens was able to be controlled by this rate operation output of a zoom ratio. This invention was able to provide pro JIEKU which can be set up simple as a result whose automatic meter reading of screen distance became possible only by selecting the menu of a display screen for the display screen size of pro JIEKU installed in arbitrary distance from the screen.

[Translation done.]

## MEANS

[Means for Solving the Problem] In a projector which condenses an outputted ray from a light source by an optical system, and light modulation is carried out by LCD etc. which have a light shutter changed and driven with an input picture signal, carries out an expansion output by a zoom lens system for projection, and carries out the display output of the projection image on a screen, A screen size input part which inputs projection screen size, and a projector and a means to detect distance to a screen, Inputted screen size and data memory which stores distance to a detected screen temporarily, A rate computing unit of a zoom ratio which calculates a rate of a zoom ratio of a zoom lens from distance and screen size to a screen memorized by data memory, A zooming drive motor which drives a zoom lens, and a zoom control part which controls a zooming drive motor so that a rate computing unit of a zoom ratio serves as a zoom ratio which carried out the operation output, With a zoom control part output, said zooming drive part which carries out a zooming drive motor drive, A rate of a zoom ratio detected by rate detection means of a zoom ratio to detect a rate of a mechanical zoom ratio of a zoom lens, and a rate detection means of a zoom ratio, and a rate computing unit of a zoom ratio compare a rate of a zoom ratio which carried out the operation output, and constitute the difference from a comparator which carries out an operation output.

[0005] An operation input section installed in a projector body part in a screen size input part, A selection menu memory which has memorized selection menu data of screen size of this projector, It constitutes from a display control part which generates a status signal which displays a selection menu on a display screen of a projector, Or a remote control input part which inputs a remote control signal by infrared rays or a feeble radio wave means from a remote control input part of the device exterior, It constitutes from a selection menu memory which has memorized selection menu data of screen size of a projector, and a display control part which generates a status signal which displays a selection menu on a display screen of this projector.

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[0007] It is considered as a rotation sensor which detects an angle of rotation of a focus adjustment driving shaft for a focal position transducer, or a straight-line sensor which detects the amount of sliding of a rectilinear direction of a focus adjustment driving shaft.

[0008] Or a timing pulse generating part which generates a periodic timing pulse for a screen distance detecting means, A modulation part which modulates ultrasonic carrier waves by a timing pulse, and an ultrasonic output element which turns an ultrasonic modulation signal to said screen, and carries out an ultrasonic output, An actuator which drives an ultrasonic output element by ultrasonic carrier waves, and ultrasonic wave receiving elements, such as a microphone which receive a reflected sound from a screen and is changed into an input signal, Linear detection of the input signal is carried out, and a wave detector which restores to a receiving timing pulse, a time lag computing unit which carries out the operation output of the time lag with a receiving timing pulse which carried out received detection with a timing pulse, and a distance computing unit which carries out the operation output of the distance to a screen from this time lag operation output constitute. It changes to a reflected sound from a screen, an

ultrasonic output sound is changed into an input signal, and a translator which amplifies this input signal and is again resented as an ultrasonic sound from an ultrasonic output element is added.

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[0013] In [drawing 2](#), a screen size setting input reads the selection screen data of screen size as shows [drawing 5](#) an example from the selection menu memory 1b which has memorized this data, and the display control part 1c generates it. (b) It sets and the selection input of the screen size is carried out by

icon operation from the operation input section 1a attached to the main part. (\*\*) Set and the remote control input part 1d carries out the received input of the control input signal by infrared rays or a feeble radio wave means from a remote control unit, etc.

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[0015](\*\*) Carry out the automatic meter reading of the distance of screen S \*\* in simple using an ultrasonic wave. The timing pulse generating part 21 generates the pulse signal of 10msec width a 100msec cycle. The modulation part 22 modulates the 40-kHz subcarrier from the ultrasonic wave oscillator which is not illustrated with this pulse signal, and carries out an abnormal-conditions output at the actuator 23. The actuator 23 drives the ultrasonic output elements 24, such as ultrasonic wave speakers or electrostriction ceramics, and discharges an ultrasonic signal towards the screen S. The conversion output of the reflected sound from the screen S is carried out to an input signal by ultrasonic wave receiving elements, such as an ultrasonic microphone. After an input signal is amplified with the amplifier 26, linear detection of it is carried out with the wave detector 27, and it generates a receiving timing pulse. The time lag computing unit 28 carries out the operation output of the time difference data of this receiving timing pulse and the timing pulse from the timing pulse generating part 21. The distance computing unit 29 carries out the operation output of the distance to a screen by one half of the values of said time difference data, and a product with the 340 m/sec sonic abbreviation for standard space. In (\*\*), in preparation for the case where reflection by a screen is insufficient, the having-function of ultrasonic reception and retransmission of message ultrasonic wave translator 30 was installed near the screen temporarily, and the role of the light reflector of an ultrasonic wave was given.

[0016]In drawing 4, (b) shows the composition of the zoom control part at the time of using a common DC motor for the rate adjustment drive motor 8 of a zoom ratio. The rate operation output of a zoom ratio from the rate computing unit 4 of a zoom ratio is inputted into the controller 62. DC power supply are connected to the controller 62, and the output voltage is controlled by said operation output. On the other hand, the polar switcher 62 performs the polarity of the output voltage to the zooming drive part 7, and ON/OFF control with the comparing output data from the comparator 5. The polarity which the polarity to which the rate operation output of a zoom ratio makes this motor a normal rotation direction in being large compared with the rate detect output of a zoom ratio makes a reverse rotation direction in being conversely small is chosen, and further, this control will be made into an open condition, if that difference becomes zero.

[0017](\*\*) The composition of the zoom control part at the time of using the stepping motor which carries out definite angle rotation for every pulse input is shown in the rate adjustment drive motor 8 of a

zoom ratio. With the rate operation output of a zoom ratio from the rate computing unit 4 of a zoom ratio, from the drive pulse table which has memorized the relation between the rate of a zoom ratio, and the number of drive pulses, the driving pulse generator 63 reads an applicable pulse number, and outputs a drive pulse. On the other hand, the polar switcher 62 performs the polarity of the output voltage to the zooming drive part 7, and ON/OFF control with the comparing output data from the comparator 5. The polarity which the polarity to which the rate operation output of a zoom ratio makes this motor a normal rotation direction in being large compared with the rate detect output of a zoom ratio makes a reverse rotation direction in being conversely small is chosen, and further, this control will be made into an open condition, if that difference becomes zero.

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[Translation done.]

## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is an important section block diagram of one example of the projector by this invention.

[Drawing 2] It is a detailed block diagram of the screen size input part by this invention.

[Drawing 3] It is a block diagram of the example of the screen distance detecting means by this invention.

[Drawing 4] It is a block diagram of the example of the zoom control part by this invention.

[Drawing 5] It is an example of a menu screen by this invention.

[Description of Notations]

S Screen

1 Rate computing unit of a zoom ratio

1a Operation input section

1b Selection menu memory

1c Display control part

1 d Remote control input part

2 Screen distance detecting means

2a A focal position transducer

2b Screen position calculation machine

3 Data memory

4 Rate computing unit of a zoom ratio

5 Comparator

6 SUMU control section

7 Zooming drive part

8 and 15 Motor

9 Rate detector of a zoom ratio

11 Final controlling element

21 Timing pulse generating part

22 Modulation part

23 Actuator

24 Ultrasonic output element

25 Ultrasonic wave receiving element

27 Wave detector

28 Time lag computing unit

29 Distance computing unit

30 Ultrasonic translator

61 A polar switcher

62 Controller

63 Driving pulse generator

64 Drive pulse table

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[Translation done.]